

Guideline 4 – Restraining individual gas cylinders and other gas products for transport

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ANZIGA aims to:

- Consult with government authorities and organisations that make policy or prepare regulations and standards which govern the production, transportation, storage, handling and use of gases.
- Collaborate with other industry and trade organisations on safety and technical matters, including public programs that relate to the gases industry.
- Produce information that promotes the safe storage, handling and use of gases.

The members of ANZIGA produce and distribute gases for the health and medical industries, manufacturing, food, scientific and hospitality industries.

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General guidelines

Precautions

The safest and recommended method to transport gas cylinders and cryogenic receptacles is by a professional gas transport company. Occasionally, there might be a need to use other transport systems and it is then essential to follow safety instructions for full and empty cylinders.

Before transporting gas cylinders, ensure that the vehicle is suitable for the task and consider the manual handling risks associated with the cylinders. Ensure that you:

- Restrain all cylinders from moving during transport, even in the event of a minor collision.
- Limit the number of cylinders to be transported.
- Use open vehicles or trailers in preference to any enclosed vehicles or trailers.
- Do not cover with a tarpaulin.
- Never drop cylinders or submit them to shock. This is an extremely hazardous practice which may result in serious injury.
- Wear safety shoes or boots, safety glasses or goggles, and leather protective gloves when handling cylinders.
- Do not smoke, use a mobile phone or other source of ignition when handling oxidising or flammable gases.

For non-flammable, non-toxic gas loads:

- An open vehicle with sides is preferable.
- Panel vans and pantechs may be used provided the driver's cab is separate from the load carrying area. This means that the driver's cab and load carrying areas are separately ventilated.

For flammable or toxic gases:

- The vehicle must have a flat bed with sides, a tailboard, and a cab which is separately ventilated from the load carrying area. (In Australia, curtain sided vehicles are deemed to be closed compartments and therefore require ventilation.)
- Flat bed vehicles without side gates must not be used, except where the cylinders are conveyed in approved banded pallets.
- Flammable gas cylinders must not be transported horizontally.
- LPG, dissolved acetylene cylinders and liquefied gases such as carbon dioxide, must be transported upright.

When loading cylinders at a gas supplier site or shop, the personnel responsible for the sale and/or loading the cylinders should provide the safety instructions on loading and transport to the driver and make sure that these are properly understood.

- Loading and transportation of cylinders must comply with all local and national Regulations.
- Toxic gases should always be transported secured in a separate well-ventilated compartment, separated from the driver.
- When transporting toxic gas cylinders, ensure that the valve outlet cap is securely fastened.
- **Note: Suppliers may refuse to load certain vehicles based on their assessment of the risk associated with the product to be loaded, the particular vehicle and the method of loading and restraining the product.**

Enclosed vehicles

If there are no other practical methods of transport, enclosed vehicles may be used subject to the following recommendations:

- It is **not recommended** that cylinders containing toxic or flammable gases are transported in enclosed vehicles.
- Check cylinder valves before loading to make sure that they are properly closed;
- Never transport cylinders with regulators or other equipment attached.
- Do not remove any valve protection device (if fitted) during transport.
- Unload the cylinders as soon as possible after arrival at destination (ventilation decreases considerably when the vehicle is stopped or parked).
- **Do not store or leave cylinders unattended in vehicle overnight or for long periods (more than 1 hour).**
- Do not use the cylinders in an enclosed vehicle.
- Carry a fire extinguisher suitable for vehicle fires.



This explosion was a result of a build up of flammable gas, ignited by the remote door locking device.

When cylinders are continually transported in enclosed vehicles (such as ambulances, service vans with welding equipment, etc.) the following is strongly recommended:

- Put a permanent system in place to restrain the cylinders (gas cylinders and cryogenic liquid receptacles).
- **Carry the cylinders in a separate, gas-tight compartment, ventilated to the outside.**
- Equip the vehicle with adequately sized ventilation openings.

Cryogenic liquid receptacles

There are two types of portable cryogenic receptacles:

- Open dewars that continuously vent into atmosphere. An oxygen deficient/enriched atmosphere will be created; therefore ensure very good ventilation and restrain the dewar in an upright position.
- Closed vessels with a pressure relief device. Ensure that the vessel is in good condition and that the valve(s) are in the correct position for transport. Due regard must be given to safe operation of the pressure relief devices fitted, both in terms of product release and sudden noise due to venting.

Cryogenic receptacles (and dry ice containers) should never be transported in the passenger or driver compartment of vehicles.

When handling cryogenic receptacles, wear appropriate personal protective equipment (PPE). That is: eye protection, long sleeves and gloves.

Emergency procedures

In the event of an emergency:

- Shut off the engine and any electrical equipment.
- Move people from the immediate area and keep upwind.
- Consider initial evacuation distance of 100 metres in all directions.
- No smoking or naked flames within 50 metres.
- Stop gas leakage if safe to do so.
- Do not use excessive force on the valves. Do not attempt to operate a damaged valve.
- Avoid breathing gas and contact with skin or eyes.
- Remove the cylinder from the vehicle to an open area if it is safe to do so.
- Notify the Fire Brigade and Police and tell them that gas cylinders or liquid cryogenic receptacles are carried on board.

Vehicle accident

In the event of a vehicle accident:

- Carry out the actions for all emergencies (above).
- Do not move vehicle if this could cause spillage or generate sparks.
- Warn other traffic.

Fire

- Carry out the actions for all emergencies (above).
- Call the Fire Brigade.
- Stop the source of flammable gas if it is safe to do so.
- Do not extinguish burning gas other than by shutting off the source of gas supply: if this is not possible, leave the gas to burn.
- Do not approach cylinders suspected of being hot.
- Remove cool cylinders from path of fire if safe to do so.
- If the fire gets out of control and cylinders are heated, evacuate personnel at least 100 metres and warn against approaching.

First aid

- Asphyxia – move to fresh air if safe to do so, and resuscitate if necessary
- Cold burns – remove any clothing that restricts blood circulation, unless it is stuck to the skin. Flush or soak the affected area with luke warm or cold water.
- Hypothermia – wrap in blanket and move to warm place.
- Call the local emergency services to seek professional medical treatment.

Hazards of transporting cylinders in a passenger car

Do not transport cylinders in the passenger compartment of any vehicle due to the difficulty of providing sufficient load restraint.

Transporting gas cylinders inside the driver or passenger compartment of passenger cars is extremely dangerous and could cause an explosion, fire, exposure to toxic gas, or asphyxiation.

If the vehicle is involved in a collision or required to brake heavily, loose cylinders may become an uncontrollable projectile that can cause serious injury or death. Uncontrolled valve impact could contribute to leaks which may result in explosion, fire, asphyxiation or release of toxic gas.

In the specific case where a medical gas cylinder is required for use by a patient, it is recommended that the vehicle be fitted with an adequate means of restraining the cylinder, for example via a secure fixed bracket arrangement designed for the cylinder to be carried. As a minimum the medical gas cylinder should be stowed securely in the passenger foot-well so as to minimise any unintended movement.



Cylinders should never be transported in car boots or the cargo areas of hatchbacks and station wagons.

Transporting cylinders & other products in a van

Transporting gas cylinders inside the passenger compartment of vans is **not safe**.

Vans are only suitable for the transport of gas cylinders if they have:

- A sealed compartment or sealed bulkhead;
- High level and low level ventilation; and
- Suitable load restraint anchorage points

Do not carry loose gas cylinders in the rear load compartment of a van. They must be adequately restrained.

Flammable gases and toxic gases **must not** be carried in vans.

The manual handling risks associated with loading cylinders into vans must be considered prior to loading.

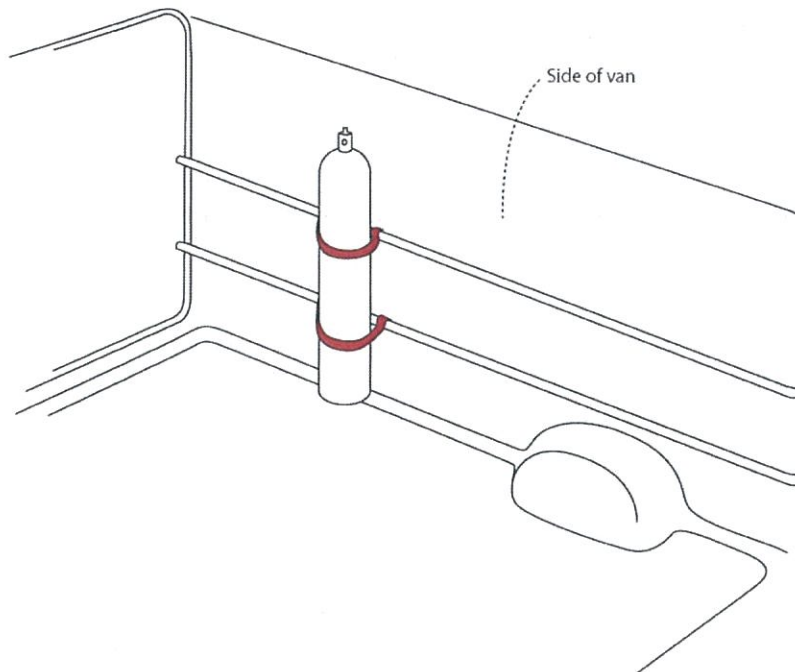


Diagram 4.1

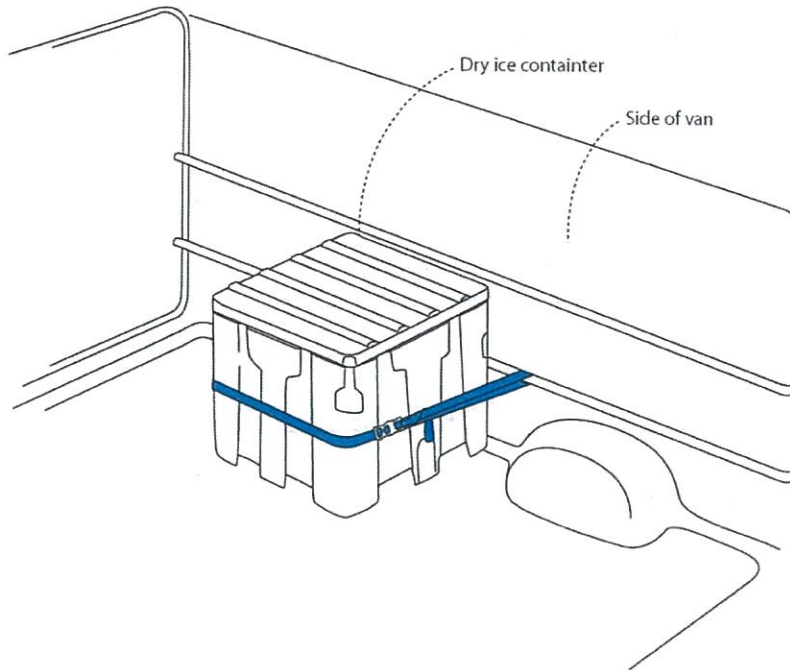


Diagram 4.2

Note: Van space must have high and low level ventilation.

Transporting cylinders in style-side utes and box trailers

Cylinders must be transported horizontally on timber pallets and restrained as shown below.

Where required, the pallet must be suitably blocked in front to maintain the correct load distribution over the axle. The pallet must either be blocked in all directions or tied down to prevent moving.

Due to manual handling hazards, it is best practice to load and restrain the cylinder with the pallet at ground level and to then load the pallet by forklift.

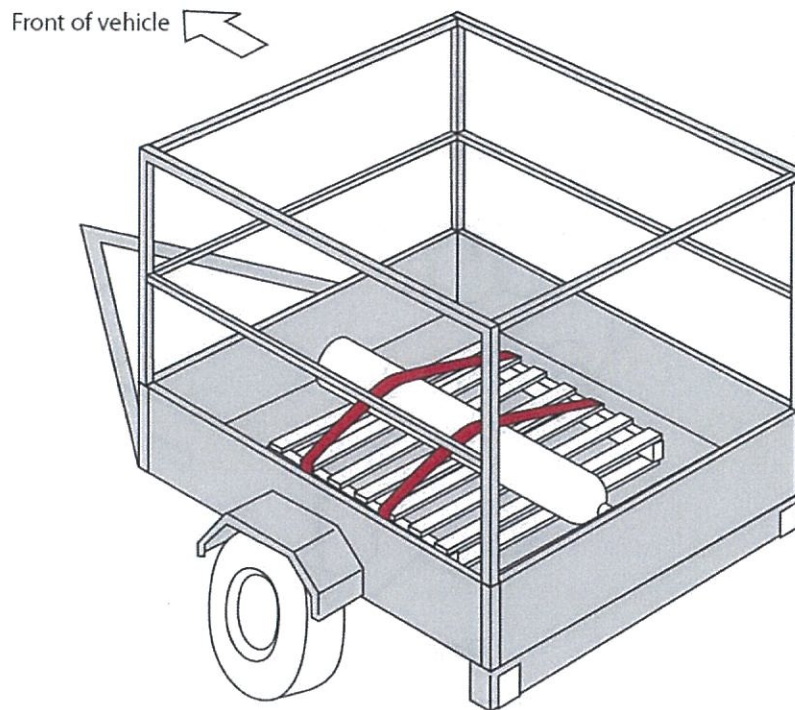


Diagram 4.3

Transporting cylinders in light commercial vehicles

Transporting cylinders upright

Restrain cylinders by lashing them to the vehicle body or containing them in a purpose-built frame.

If transporting cylinders upright against a headboard:

- The total weight of the cylinders should not exceed 250 kg.
- Apply at least two horizontal straps, as shown below:

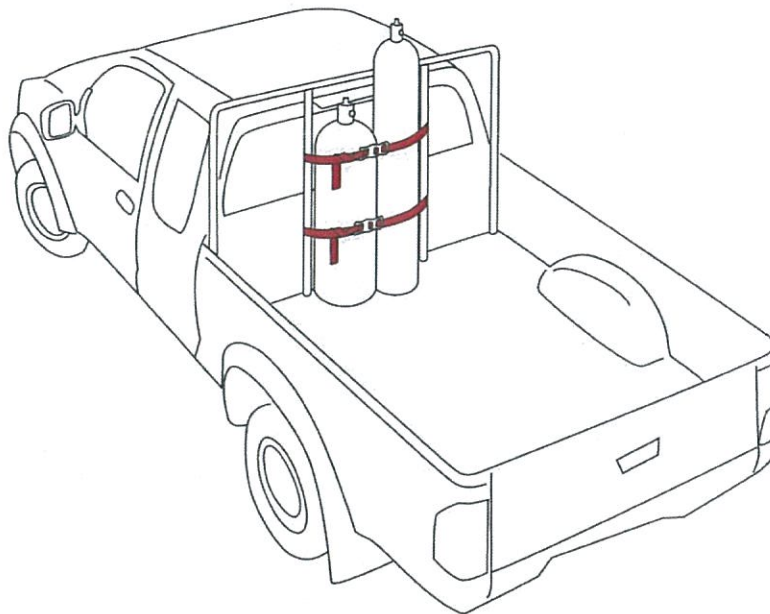


Diagram 4.4

Do not use the following materials for restraining cylinders:

- Elastic straps
- Rope
- Duct tape

Webbing straps must be at least 38mm wide with a minimum Lashing Capacity of 1000 kg.

Transporting cylinders lying down

If transporting cylinders lying down:

- Place the cylinders lengthwise on the deck.
- Position the cylinders with the valves facing rearwards, with the base blocked against the headboard or another strong part of the load.
- Apply at least two tie-down strap, as shown below.

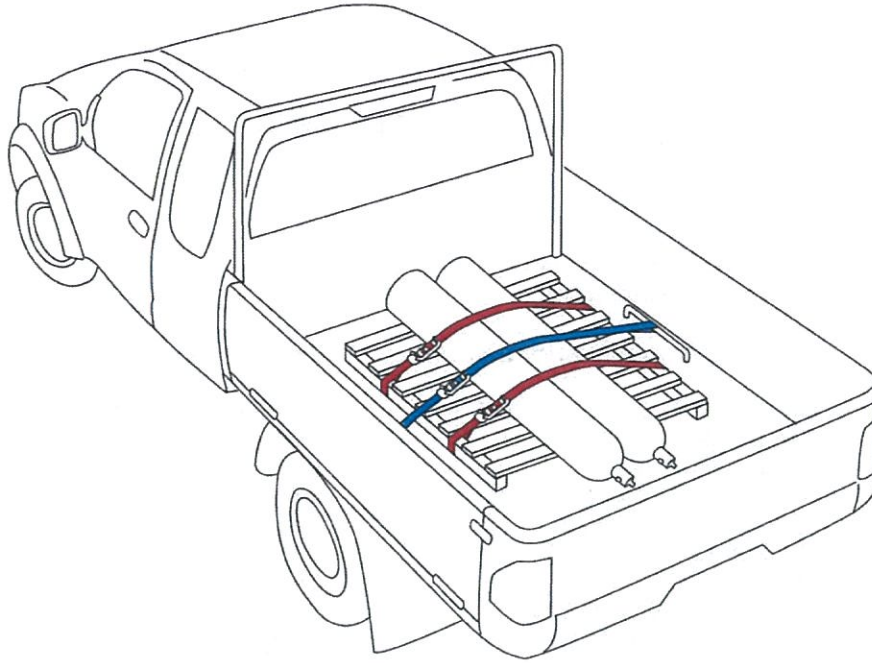


Diagram 4.5

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